

WHAT IS CLAIMED IS:

1           1.     A method for recognizing a change in a rate of data transmission in a  
2     communication system which transmits data at a rate which is selected from a plurality  
3     of rates, the communication system being capable of conducting several communication  
4     sessions simultaneously on a single carrier frequency, comprising:

5                     orthogonally encoding the data in a plurality of packets, each packet having  
6     a plurality of symbols having signal points in a field, the signal points of consecutively  
7     transmitted symbols being correlated unless the rate is changed, the data being further  
8     encoded such that only orthogonal descendants of a selected maximum rate code are used  
9     for one of the transmitters communicating with a selected receiver,

10                    transmitting the encoded data to the selected receiver, and orthogonally  
11     decoding the encoded data,

12                    identifying the signal points of consecutively transmitted symbols, and

13                    recognizing a change in the rate of data transmission when the signal points  
14     of consecutively transmitted symbols are not correlated.

1           2.     A method for recognizing a change in a rate of data transmission in a  
2     communication system which transmits data at a rate which is selected from a plurality

3 of rates, the communication system being capable of conducting several communication  
4 sessions simultaneously on a single carrier frequency, comprising the steps of:

5 orthogonally encoding the data in a plurality of packets, each packet having  
6 a plurality of symbols having signal points in a field, the signal points of consecutively  
7 transmitted symbols being correlated unless the rate is changed, the data being further  
8 encoded such that only orthogonal descendants of a selected maximum rate code are used  
9 for one of the transmitters communicating with a selected receiver,

10 transmitting the encoded data to the selected receiver, and orthogonally  
11 decoding the encoded data,

12 identifying the signal points of consecutively transmitted symbols, and  
13 recognizing a change in the rate of data transmission when the signal points  
14 of consecutively transmitted symbols are not correlated.

1 3. A signal for use in a data communication system having at least one  
2 transmitting station and at least one receiving station, the signal comprising a plurality of  
3 data packets, each said data packet having a plurality of symbols, a number of symbols  
4 in each said data packet being selected from one of several numbers of symbols,  
5 each said symbol having signal points in selected positions in a field,  
6 consecutively transmitted signal points being correlated in said field unless  
7 said number of signal points in said data packets changes, consecutively transmitted

8 signal points which are not correlated in said field indicating that said number of signal  
9 points in said data packets has changed.

10 4. A communication station comprising a receiver, a transmitter and at least  
11 one antenna, including:

12 means for orthogonally decoding data received from another  
13 communication station, the data having been encoded in a plurality of packets, each  
14 packet having a plurality of symbol points in a field, the signal points of consecutively  
15 transmitted symbols being correlated unless the rate is changed, the data having been  
16 further encoded such that only orthogonal descendants of a selected maximum rate code  
17 are used for communications with the communication station, and

18 means for identifying the signal points of consecutively transmitted symbols  
19 in the decoded data and recognizing a change in the rate of data transmission when the  
20 signal points of consecutively transmitted signal points are not correlated.

1 5. The communication station of claim 4 wherein the receiver decodes the data  
2 at a first symbol rate, and when a symbol rate change is recognized, the first symbol rate  
3 is increased to a new symbol rate and the data is reprocessed to determine whether the  
4 new symbol rate is the current symbol rate of the data.

1           6.       The communication station of claim 5, wherein if it is determined that the  
2 new symbol rate is not the current symbol rate of the data, the new symbol rate is  
3 decreased and the data is reprocessed to determine whether the decreased new symbol  
4 rate is the current symbol rate of the data.

1           7.       The communication station of claim 4, wherein (a) two consecutive  
2 symbols  $\rho_t$  and  $\rho_{t+1}$  are decoded at a first symbol rate when the data is decoded, (b) if  
3 both symbols  $\rho_t$  and  $\rho_{t+1}$  are considered valid, both symbols  $\rho_t$  and  $\rho_{t+1}$  are decoded to  
4 determine whether they are correlated; (c) if the symbols  $\rho_t$  and  $\rho_{t+1}$  are not correlated,  
5 then the first symbol  $\rho_t$  is output and the symbols  $\rho_{t+1}$  and a following symbol  $\rho_{t+2}$  are  
6 decoded; and (d) if both symbols  $\rho_{t+1}$  and  $\rho_{t+2}$  are considered valid, designating the  
7 symbols  $\rho_{t+1}$  and  $\rho_{t+2}$  as the symbols  $\rho_t$  and  $\rho_{t+1}$  and repeating steps (b), (c) and (d), unless  
8 consecutive symbols are correlated.

1           8.       The communication station of claim 7 wherein (e) if the symbols  $\rho_t$  and  $\rho_{t+1}$   
2 are correlated, then the first symbol rate  $q$  is doubled so that  $\rho_t$  and  $\rho_{t+1}$  are decoded as  
3 a single symbol  $\rho'_t$  and a second symbol  $\rho_{t+1}$  based on the symbol rate  $2q$  is decoded; if  
4 both symbols  $\rho'_t$  and  $\rho_{t+1}$  are valid, then designating the repeating steps (b), (c) and (d).

1           9.     The communication station of claim 7, wherein if the symbol  $\rho_{t+1}$  is  
2 considered valid and the symbol  $\rho_{t+2}$  is considered invalid in step (d), then the symbol  $\rho_{t+1}$   
3 is designated  $\rho_t$  and is output, the first symbol rate  $q$  is reduced to  $q/2$  and a new symbols  
4  $\rho_{t+1}'$  and  $\rho_{t+2}'$  are computed from  $\rho_{t+2}$ ,  $\rho_{t+1}'$  and  $\rho_{t+2}'$  are decoded, and processed further  
5 depending on whether  $\rho_{t+1}'$  and  $\rho_{t+2}'$  are valid or invalid.

1           10.    The communication station of claim 7, wherein if the symbol  $\rho_{t+1}$  is  
2 considered invalid in step (d), then the first symbol rate  $q$  is reduced to  $q/2$  and  $\rho_t$  is  
3 decoded as  $\rho_t'$  and  $\rho_{t+1}'$ ,  $\rho_t'$  and  $\rho_{t+1}'$  are checked, and are processed further depending on  
4 whether they are valid or invalid.

1           11.    A communication station comprising a receiver, a transmitter and at least  
2 one antenna, including:

3               a decoder which orthogonally decodes data received from another  
4 communication station, the data having been encoded in a plurality of packets, each  
5 packet having a plurality of symbol points in a field, the signal points of consecutively  
6 transmitted symbols being correlated unless the rate is changed, the data having been  
7 further encoded such that only orthogonal descendants of a selected maximum rate code  
8 are used for communications with the communication station, and

9 a detector which identifies the signal points of consecutively transmitted  
10 symbols in the decoded data and recognizes a change in the rate of data transmission  
11 when the signal points of consecutively transmitted signal points are not correlated.

1 12. The communication station of claim 11 wherein the receiver decodes the  
2 data at a first symbol rate, and when a symbol rate change is recognized, the first symbol  
3 rate is increased to a new symbol rate and the data is reprocessed to determine whether  
4 the new symbol rate is the current symbol rate of the data.

1 13. The communication station of claim 12, wherein if it is determined that the  
2 new symbol rate is not the current symbol rate of the data, the new symbol rate is  
3 decreased and the data is reprocessed to determine whether the decreased new symbol  
4 rate is the current symbol rate of the data.

1 14. The communication station of claim 11, wherein (a) two consecutive  
2 symbols  $\rho_t$  and  $\rho_{t+1}$  are decoded at a first symbol rate when the data is decoded, (b) if  
3 both symbols  $\rho_t$  and  $\rho_{t+1}$  are considered valid, both symbols  $\rho_t$  and  $\rho_{t+1}$  are decoded to  
4 determine whether they are correlated; (c) if the symbols  $\rho_t$  and  $\rho_{t+1}$  are not correlated,  
5 then the first symbol  $\rho_t$  is output and the symbols  $\rho_{t+1}$  and a following symbol  $\rho_{t+2}$  are  
6 decoded; and (d) if both symbols  $\rho_{t+1}$  and  $\rho_{t+2}$  are considered valid, designating the

7 symbols  $\rho_{t+1}$  and  $\rho_{t+2}$  as the symbols  $\rho_t$  and  $\rho_{t+1}$  and repeating steps (b), (c) and (d), unless  
8 consecutive symbols are correlated.

1 15. The communication station of claim 14 wherein (e) if the symbols  $\rho_t$  and  
2  $\rho_{t+1}$  are correlated, then the first symbol rate  $q$  is doubled so that  $\rho_t$  and  $\rho_{t+1}$  are decoded  
3 as a single symbol  $\rho'_t$  and a second symbol  $\rho_{t+1}$  based on the symbol rate  $2q$  is decoded;  
4 if both symbols  $\rho'_t$  and  $\rho'_{t+1}$  are valid, then designating the repeating steps (b), (c) and (d).

1 16. The communication station of claim 14, wherein if the symbol  $\rho_{t+1}$  is  
2 considered valid and the symbol  $\rho_{t+2}$  is considered invalid in step (d), then the symbol  $\rho_{t+1}$   
3 is designated  $\rho_t$  and is output, the first symbol rate  $q$  is reduced to  $q/2$  and a new symbols  
4  $\rho_{t+1}'$  and  $\rho_{t+2}'$  are computed from  $\rho_{t+2}$ ,  $\rho_{t+1}'$  and  $\rho_{t+2}'$  are decoded, and processed further  
5 depending on whether  $\rho_{t+1}'$  and  $\rho_{t+2}'$  are valid or invalid.

1 17. The communication station of claim 14, wherein if the symbol  $\rho_{t+1}$  is  
2 considered invalid in step (d), then the first symbol rate  $q$  is reduced to  $q/2$  and  $\rho_t$  is  
3 decoded as  $\rho'_t$  and  $\rho_{t+1}'$ ,  $\rho'_t$  and  $\rho_{t+1}'$  are checked, and are processed further depending on  
4 whether they are valid or invalid.